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RESEARCH PAPER

Effects of planting geometry and fertilizer levels on growth and yield of hybrid brinjal

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Abstract : An experiment was conducted during *Kharif* season of 2013-14 to know the effect of spacing and fertilizer levels on growth, yield, nutrient uptake and available soil nutrients in hybrid brinjal. The plants grown with wider spacing (90 cm x 90 cm) (S_5) recorded maximum number of branches per plant, number of leaves per plant, canopy spread, total dry matter production, yield and nutrient uptake. While, maximum plant height and available soil nutrient status of crop were recorded in closer spacing (75 cm x 60 cm) (S_1). Application of higher fertilizer levels (F_3) improved the vegetative characters, yield and nutrient uptake significantly. Among interaction effects of spacing and higher fertilizer levels S_5F_3 (90 cm x 90 cm + 187.5:150:75 kg N, P_2O_5 and K_2O/ ha) recorded significantly maximum plant height, number of branches per plant, number of leaves per plant, canopy spread, total dry matter production, yield and nutrient uptake.

Key Words : Brinjal hybrid, Spacing, Fertilizers, Nutrient uptake

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INTRODUCTION

Eggplant or brinjal (*Solanum melongena* L.) belongs to the family Solanaceae and is the most important widely consumed vegetable in India. It is grown in 601,000 hectares with production of eight to nine million tonnes (equivalent to one quarter of global production), which makes India the second largest producer of eggplant in the world. The increased yields in brinjal can be achieved by use of hybrids.

As hybrids are vigorous, spiny in nature and they respond very well to management practices. Alternation in spacing and nutrient management greatly influence brinjal yield. Common practice followed by the most of the farmers in hybrid brinjal production is adoption of wider spacing and application of higher fertilizer than the recommendation of university or research institute (Anonymous, 2014). Adequate information on optimum spacing and fertilizer requirement for hybrid brinjal under tropical condition is lacking.

In view of this and to revalidate the spacing and fertilizer requirement for hybrid brinjal a study was undertaken.

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MATERIAL AND METHODS

A field experiment was carried out in factorial Randomized Block Design with three replications. The experiment was conducted during *Kharif* season of 2013-14 at Saidapur Farm, University of Agricultural Sciences, Dharwad. Fifteen treatment combinations comprising five spacings (S_1-75 cm x 60 cm, S_2-75 cm x 75 cm, S_3-90 cm x 60 cm, S_4-90 cm x 75 cm and S_5-90 cm x 90 cm) and three fertilizer levels (F_1-125:100:50 kg N, P_2O_5 and K_2O/ ha, F_2-156.25:125:62.5 kg N, P_2O_5 and K_2O/ ha and F_3- 187.5:150:75 kg N, P_2O_5 and K_2O/ ha) were analyzed for growth and yield parameters of brinjal. Popular private brinjal hybrid Mahyco-10 was used for the study. As per the spacing treatments seedlings were transplanted and respective fertilizers were imposed. Full dose of phosphorus and potassium and half dose of nitrogen were applied at the time of transplanting and remaining half dose of nitrogen was applied in two split doses at 6th and 10th weeks after transplanting. The crop was raised successfully by adopting proper cultural practices and plant protection measures (Anonymous, 2014). Five plants in each plot were randomly selected for taking observations. The brinjal fruits were harvested at weekly interval as and when they mature and data on yield was computed. Fisher's method of analysis of variance was applied for analysis of variance and interpretation of data. Level of significance of 'F' test used was p=5 per cent (Gomez and Gomez, 1984).

RESULTS AND DISCUSSION

Significant variation in plant height, number of branches per plant, number of leaves per plant, canopy spread, marketable yield, nutrient uptake was observed in different levels of spacing and fertilizers levels (Table 1 and 2). Highest fruit yield (78.73 t/ha) was obtained in wider spacing of 90 cm x 90 cm (S_5) compared of 90 cm x 75 cm(S_4), 90 cm x 60 cm(S_3), 75 cm x 75 cm (S_2) and 75 cm x 60 cm(S_1) accountings to an increase of 9, 5, 27.55 and 27.29 per cent, respectively. Significant per cent increase was also observed for growth parameters like number of branches per plant (25.90), number of leaves per plant (122.29), canopy spread (75.47 cm), dry matter production (304.3 g/plant) in wider spacing. Similarly higher yield with wider spacing was observed by Ndereyimana *et al.* (2014); Baloch *et al.* (2012); Alfred (2009) and Drsekender (2006) in brinjal. Further

Table 1 : Vegetative growth characters of hybrid brinjal as influenced by spacing, fertilizer levels and their interaction

Fertilizer levels \ Spacing	Plant height (cm)					
	S_1	S_2	S_3	S_4	S_5	Mean
F_1	98.37	96.40	91.90	88.97	85.60	92.07
F_2	100.23	97.50	94.43	89.23	86.50	93.58
F_3	102.80	98.07	95.73	91.47	87.32	95.09
Mean	100.47	97.32	94.02	89.56	86.49	
For comparison of	S.E.±		C.D. (P=0.05)			
Spacing (S)	0.35		1.03			
Fertilizer level (F)	0.27		0.79			
Interaction (S x F)	0.61		NS			

Fertilizer levels \ Spacing	No. of branches /plant					
	S_1	S_2	S_3	S_4	S_5	Mean
F_1	20.43	22.33	23.27	24.20	25.53	23.15
F_2	21.07	22.63	23.70	24.53	25.80	23.55
F_3	21.37	22.93	23.97	25.13	26.37	23.95
Mean	20.96	22.63	23.64	24.62	25.90	
For comparison of	S.E.±		C.D. (P=0.05)			
Spacing (S)	0.10		0.30			
Fertilizer level (F)	0.08		0.23			
Interaction (S x F)	0.18		NS			

Fertilizer levels \ Spacing	No. of leaves per plant					
	S_1	S_2	S_3	S_4	S_5	Mean
F_1	104.07	108.90	113.40	116.90	119.63	112.58
F_2	106.43	110.73	114.73	118.72	122.43	114.64
F_3	109.97	113.47	116.47	120.67	124.80	116.81
Mean	106.49	110.96	114.87	118.78	122.29	
For comparison of	S.E.±		C.D. (P=0.05)			
Spacing (S)	0.57		1.66			
Fertilizer level (F)	0.44		1.28			
Interaction (S x F)	0.99		NS			

Fertilizer levels \ Spacing	Canopy spread (cm)					
	S_1	S_2	S_3	S_4	S_5	Mean
F_1	66.10	68.57	70.67	73.07	74.80	70.64
F_2	67.30	68.97	71.63	73.47	75.57	71.39
F_3	67.97	69.87	72.47	74.53	76.03	72.17
Mean	67.12	69.13	71.59	73.69	75.47	
For comparison of	S.E.±		C.D. (P=0.05)			
Spacing (S)	0.20		0.58			
Fertilizer level (F)	0.15		0.45			
Interaction (S x F)	0.34		NS			

Note: NS = Non-significant

S_1: 75 cm x 60 cm, S_2: 75 cm x 75 cm, S_3: 90 cm x 60 cm, S_4: 90 cm x 75 cm and S_5: 90 cm x 90 cm

F_1:125:100:50 kg N, P_2O_5 and K_2O/ ha, F_2:156.25:125:62.5 kg N, P_2O_5 and K_2O/ ha and F_3:187.5:150:75 kg N, P_2O_5 and K_2O/ ha

Table 2 : Growth and nutrient uptake (kg/plant) of hybrid brinjal as influenced by spacing, fertilizer levels and their interaction

Spacing / Fertilizer levels	Total dry matter (g/plant)						Nitrogen (kg/plant)						Phosphorus (kg/plant)						Potassium (kg/plant)					
	S_1	S_2	S_3	S_4	S_5	Mean	S_1	S_2	S_3	S_4	S_5	Mean	S_1	S_2	S_3	S_4	S_5	Mean	S_1	S_2	S_3	S_4	S_5	Mean
F_1	181.57	210.30	245.47	271.33	293.40	240.41	114.70	115.57	119.33	125.70	128.57	120.77	21.10	31.83	39.00	44.17	52.40	37.70	47.63	48.77	50.30	52.33	53.83	50.57
F_2	192.47	225.73	255.13	281.33	306.03	252.14	120.53	127.57	132.43	137.47	140.13	131.63	26.00	33.43	41.17	47.40	55.10	40.62	48.33	50.23	53.40	55.23	59.13	53.27
F_3	200.03	232.55	261.55	286.17	313.17	258.73	150.17	154.00	159.13	163.33	169.13	159.15	28.63	36.17	42.77	49.23	56.50	42.66	50.73	52.13	54.73	57.93	62.03	55.51
Mean	191.36	222.86	254.02	279.61	304.30		128.47	132.38	136.97	142.17	145.94		25.24	33.81	40.98	46.93	54.67		48.90	50.38	52.81	55.17	58.33	
For comparison of	S.E.±		C.D. (P=0.05)				S.E.±		C.D. (P=0.05)				S.E.±		C.D. (P=0.05)				S.E.±		C.D. (P=0.05)			
Spacing (S)	0.76		2.19				0.38		1.11				0.24		0.70				0.22		0.62			
Fertilizer level (F)	0.59		1.70				0.30		0.86				0.19		0.55				0.17		0.48			
Interaction (S x F)	1.31		NS				0.66		1.92				0.43		1.22				0.37		1.08			

Note: NS = Non- significant
S : 75 cm x 60 cm, S_2: 75 cm x 75 cm, S_3: 90 cm x 60 cm, S_4: 90 cm x 75 cm and S_5: 90 cm x 90 cm
F :125:100:50 kg N, P_2O_5 and K_2O/ ha, F_2:156.25:125:62.5 kg N, P_2O_5 and K_2O/ ha and F_3:187.5:150:75 kg N, P_2O_5 and K_2O/ ha

Table 3 : Marketable yield (t/ha), available nitrogen, phosphorus and potassium (kg/ ha) status of experimental soil after harvest of brinjal as influenced by spacing, fertilizer levels and their interactions

Spacing / Fertilizer levels	Marketable yield (t/ha)						Nitrogen (kg/plant)						Phosphorus (kg/plant)						Potassium (kg/plant)					
	S_1	S_2	S_3	S_4	S_5	Mean	S_1	S_2	S_3	S_4	S_5	Mean	S_1	S_2	S_3	S_4	S_5	Mean	S_1	S_2	S_3	S_4	S_5	Mean
F_1	58.66	57.81	72.03	65.05	72.98	65.31	126.57	123.87	122.13	116.40	147.93	127.38	48.70	46.47	43.63	42.30	40.50	44.32	145.43	143.67	140.53	135.70	132.33	139.53
F_2	61.66	61.36	75.16	70.85	79.61	69.73	143.43	140.53	137.63	134.53	131.80	137.59	51.33	49.37	46.30	44.50	43.97	47.09	152.20	147.80	141.27	137.53	134.27	142.61
F_3	65.24	64.48	76.36	79.10	83.60	73.76	147.00	145.90	141.13	136.97	132.93	140.79	52.63	51.07	48.30	46.93	46.23	49.03	154.70	149.87	143.73	138.37	135.93	144.52
Mean	61.85	61.22	74.52	71.67	78.73		139.00	136.77	133.63	129.30	137.56		50.89	48.97	46.08	44.58	43.57		150.78	147.11	141.84	137.20	134.18	
For comparison of	S.E.±		C.D. (P=0.05)				S.E.±		C.D. (P=0.05)				S.E.±		C.D. (P=0.05)				S.E.±		C.D. (P=0.05)			
Spacing (S)	0.31		0.89				4.08		11.61				0.31		0.89				0.15		0.44			
Fertilizer level (F)	0.24		0.69				3.10		8.10				0.24		0.69				0.12		0.34			
Interaction (S x F)	0.53		1.54				6.94		NS				0.53		NS				0.26		0.75			

Note: NS – Non significant
S_1: 75 cm x 60 cm, S_2: 75 cm x 75 cm, S_3: 90 cm x 60 cm, S_4: 90 cm x 75 cm and S_5: 90 cm x 90 cm
F_1:125:100:50 kg N, P_2O_5 and K_2O/ ha, F_2:156.25:125:62.5 kg N, P_2O_5 and K_2O/ ha and F_3:187.5:150:75 kg N, P_2O_5 and K_2O/ ha

wider spacing (90 cm x 90 cm) recorded the highest nutrient uptake of N, P and K (145.94, 54.67 and 58.33 kg/plant, respectively) attributing to higher fruit yield. These results agree with finding of Ndereyimana *et al.* (2014) and Ibeawuchi *et al.* (2008) in brinjal.

The marketable yield of brinjal fruits differed significantly with the application of different fertilizer levels. Irrespective of spacing levels the highest marketable yield (73.76 t/ha) was recorded with the application of 187.5:150:75 kg NPK/ha (F_3), which was 5 and 12 per cent higher than application of F_2 and F_1 levels of fertilizers, respectively. (Table 1). The increased yield due to application of 187.5:150:75 kg NPK/ha (F_3) could be in turn attributed to increased vegetative growth of the plant as evidenced by increased plant height (95.09 cm), number of branches per plant (23.95), number of leaves per plant (116.81), canopy spread (72.17 cm), total dry matter accumulation (258.73 g/pant) and maximum uptake of nutrient from the soil (159.15, 42.66 and 55.51 kg NPK/ha, respectively). Similar result of increased yield with the application of higher fertilizer dose was reported by Ndereyimana *et al.* (2013); Kehinde *et al.* (2011); Thakre *et al.* (2005) and Selvi *et al.* (2004) in brinjal. The lowest marketable fruit yield (65.31 t/ha) was recorded in the treatment with 125:100:50 kg NPK/ha fertilizer (F_1) which may be due to lesser vegetative growth parameters and nutrient uptake from the soil.

The interaction effects of spacing and fertilizer levels also had considerable influence on production. Among the interactions of spacing and fertilizer levels, wider spacing along with higher fertilizer levels (S_5F_3) recorded maximum growth and yield (Table 1 and 2). From the study it revealed that adoption of wider spacing 90 cm x 90 cm (S_5) along with application of higher level of fertilizer F_3 (187.5:150:75 kg NPK/ha) was found most suitable for commercial production of hybrid brinjal.

REFERENCES

Alfred, K.N.(2009). Effect of spacing and chemical fertilization on growth, yield and nutritive quality of ravaya (*Solanum melongena* cv. BABY AUBERGINE). M. Sc. Thesis, School of Research and Graduate Studies, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana.

Anonymous (2014). Package of practices for horticulture crops, University of Horticultural Sciences, Bagalkot, Karnatak State, India.

Baloch, Q.B., Dero B. and Memon, N. (2012). Influence of sowing patterns on the growth and productivity of brinjal (*Solanum melongena*). *J. Agric. Technol.*, **8** (6) : 2043-2051.

Drsekender (2006). Effect of spacing and bud pruning on the growth and yield of brinjal (*Solanum melongena* L.). M. Sc. Thesis, South Asian University, NEW DELHI (INDIA).

Gomez, K.A. and Gomez, A.A. (1984). *Statistical procedures for agricultural research* (2nd Ed.). John Wiley and Sons, NewYork, 680p.

Ibeawuchi, I.I., Njoku, M., Miriam, O., Anyanwa, C.P. and Onyia, V.N. (2008). Plant spacing dry matter accumulation and yield of local and improved maize cultivar. *J. American Sci.*, **83** : 581-588.

Kehinde, N.A., Togun, A.O., Abiodun, M.O. and Chude, V.O.(2011). Effects of NPK fertilizer on growth, dry matter production and yield of eggplant in south western Nigeria. *Agric. & Biology J. North America*, **2** (7) : 1117-1125.

Ndereyimana, A., Praneetha, S., Pugalendhi, L., Pandia, B.J. and Rukundo, P. (2013). Earliness and yield parameters of eggplant (*Solanum melongena* L.) grafts under different spacing and fertigation levels. *African J. Plant Sci.*, **7** (11) : 543 - 547.

Ndereyimana, A., Praneetha, S., Pugalendhi, L. and Pandia, B.J.(2014). Influence of grafting, spacing and fertigation levels on eggplant (*Solanum melongena* L.) leaf nitrogen, phosphorus and potassium contents. *Internat. Res. J. Hort.*, **2** (1) : 6-10.

Selvi, D, Thiageshwari, S. and Santhy, P. (2004). Effect of combined application of organic manures and inorganic fertilizers in brinjal. *J. Maharashtra Agric. Univ.*, **29**: 220 - 223.

Thakre, C.M., Badole, W.P., Tiwari, T.K. and Sarode, P.B. (2005). Effect of different levels of sulphur, phosphorus and potassium on yield and quality of brinjal. *J. Maharashtra Agric. Univ.*, **30** (3) : 352-353.